January 2002

Indonesia

Indonesia is important to world energy markets because of its OPEC membership and substantial, but declining, oil production. Indonesia also is the world's largest liquefied natural gas (LNG) exporter.

The information contained in this report is the best available as of January 2002, and can change.

GENERAL BACKGROUND

Indonesia's economic growth slowed modestly in 2001 in response to the global economic slowdown, which reduced demand for the country's exports. Indonesia's real gross domestic product (GDP) grew at a rate of 3.1% in 2001, down from 4.8% in 2000. Real GDP growth is forecast at 3.5% for 2002.

With about 75% of Indonesian businesses in technical bankruptcy following the country's economic collapse in 1998, the government was forced to turn to the International Monetary Fund (IMF) for an emergency debt-relief package totaling $43 billion. The IMF recommended that Indonesia implement an

economic reform program in order to help save its economy. IMF recommendations included creating greater transparency in the issuing of government loans and subsidies, and stricter enforcement of laws and regulations in the area of government procurement. The government has announced several reform initiatives since receiving the IMF bailout package, including the planned privatization of several sectors of the economy, but progress has been slow. A follow-on loan package, from several lenders including the United States and the IMF, was approved in October 2000. Installments of IMF funds were delayed in 2001 due to delays in economic reforms, but in September 2001, the IMF resumed transfers and released a $395 million loan tranche under the follow-on loan package.

In July 2001, Vice President Megawati Sukarnoputri assumed the presidency of Indonesia after President Abdurrahman Wahid was removed from office by the national legislature. The regional challenges facing the Indonesian government remain the same - a separatist movement in Aceh, an oil and gas rich province in north Sumatra which abuts the strategically important Strait of Malacca; and a separatist movement in Irian Jaya, a gas-rich province at the eastern end of the country.

One of the key areas in which energy and politics intersect in Indonesia is the distribution of oil and gas revenues between the central government in Jakarta and regional governments in areas which produce oil and gas. Since Indonesia's transition to democracy, the country's regional governments have been pressing for a greater share of oil and gas revenues.

OIL

Indonesia currently holds proven oil reserves of 5 billion barrels. This represents a 14% decline in proven reserves since 1994. Much of Indonesia's proven oil reserve base is located onshore. Central Sumatra is the country's largest oil producing province and the location of the large Duri and Minas oil fields. Other significant oil field development and production is located in accessible areas such as offshore northwestern Java, East Kalimantan, and the Natuna Sea. Indonesian crude oil varies widely in quality, with most streams

having gravities in the 22º to 37º API range. Indonesia's two main export crudes are Sumatra Light, or Minas, with a 35º API, and the heavier, 22º API Duri crude.

During the first ten months of 2001, Indonesian crude oil production averaged about 1.22 million barrels per day (bbl/d). Crude oil production had ranged between 1.3 and 1.4 million bbl/d between 1990 and 2000. The decrease in 2001 was due mainly to the natural decline of aging oil fields. Besides crude oil, Indonesia also produces approximately 235,000 bbl/d of natural gas liquids and lease condensate, which are not part of its OPEC quota, bringing the country's total oil production to around 1.45 million bbl/d. Indonesia is the only Southeast Asian member of OPEC, and its current OPEC crude oil production quota, which became effective on January 1, 2002, is 1.125 million bbl/d.

Indonesia's oil production during the 1990s remained relatively flat as introduction of crude streams from new, smaller fields has helped compensate for declines at many of the country's mature oil fields. To meet its goal of increasing production, Indonesia has stepped up efforts to sign new oil exploration contracts. Nine new production sharing contracts (PSCs) were signed during 2001, and the Indonesian government plans to offer 17 new blocks through a tender in 2002, though no date has been set. The majority of Indonesia's producing oil fields are located in the central and western sections of the country. Therefore, the focus of new exploration has been on frontier regions, particularly in eastern Indonesia. Sizable, but as of yet unproven, reserves may lie in the numerous, geologically complex, pre-tertiary basins located in eastern Indonesia. These regions are much more remote and the terrain more difficult to explore than areas of western and central Indonesia.

Companies producing from existing fields are investing in programs to increase recovery rates and to prolong the life of the fields. Caltex, which has the largest operation of any multinational oil company in Indonesia, is undertaking a steam injection project at the Duri field on Sumatra.

Three major new oil projects are expected to begin production before 2004. Unocal's West Seno field, under development offshore from East Kalimatan, is expected to begin producing 60,000 bbl/d by the end of 2002. An additional 100,000 bbl/d of production capacity is to be added by Conoco's Belanek project in the West Natuna Block B by 2004. Exxon Mobil's Banyu Urip field, in Java, is expected to come onstream in 2003 and reach its peak production capacity in 2004. Even with these new fields, though, Indonesia's oil production is not likely to rise markedly, due to the continuing decline of mature fields. The country could possibly become a net oil importer by the end of the current decade.

Oil Sector Reforms

The liberalization of Indonesia's downstream oil and gas sector has been under discussion for several years. In October 2001, the Indonesian legislature passed legislation which will remove Pertamina's monopoly on upstream oil development (which requires it to be included in all PSCs) within two years. Its monopoly on the distribution of petroleum products is to be terminated within four years.

Indonesia's Ministry of Mines and Energy will take over the function, currently carried out by Pertamina, of awarding and supervising production sharing contracts with foreign oil companies. Foreign firms also are to be freed from some of the regulatory approval requirements which they argue hinder their efficiency. Subsidies for domestic prtroleum products consumption have been reduced in a bid to reduce the government's budget deficit and restrain increases in domestic consumption. One concern foreign oil companies have with the new law is the granting of a limited authority to regional governments to tax oil companies' profits.

Refining

Indonesia has eight refineries, with a combined capacity of 992,745 bbl/d. The largest refineries are the 348,000-bbl/d Cilacap in Central Java, the 240,920-bbl/d Balikpapan in Kalimantan, and the 125,000-bbl/d Balongan, in Java. A major expansion of the Cilacap refinery was completed in 1999.

One new project currently under consideration is a 300,000-bbl/d Saudi Arabian-Chinese-Indonesian joint venture refinery planned for Pare-Pare in South Sulawesi. This would be an export-oriented refinery, taking Saudi crude and refining it for sale primarily to the Chinese market. A feasibility study for the project is underway.

NATURAL GAS

Indonesia has proven natural gas reserves of 92.5 trillion cubic feet (Tcf). Most of the country's natural gas reserves are located near the Arun field in North Sumatra, around the Badak field in East Kalimantan, in smaller fields offshore Java, the Kangean Block offshore East Java, a number of blocks in Irian Jaya, and the Natuna D-Alpha field, the largest in Southeast Asia. Despite its significant natural gas reserves and its position as the world's largest exporter of liquefied natural gas (LNG), Indonesia still relies on oil to supply about half of its energy needs. As Indonesia's oil production has leveled off in recent years, the country has tried to shift towards using its natural gas resources for power generation. However, the domestic natural gas distribution infrastructure still is not extensive.

ExxonMobil's Arun LNG export terminal was the focus of much attention in 2001, as it was forced to cease operation and shut in production at the Arun gas fields due to security problems arising out of the ongoing conflict in Aceh. The facility reopened in August 2001, and has resumed supplies to its customers in Japan and South Korea.

A particularly significant Indonesian gas field, Natuna, is located in the South China Sea, 683 miles north of Jakarta and 140 miles northeast of Natuna Island. Discovered in 1970 by Italy's Agip, the field contains an estimated 46 Tcf of recoverable reserves. Agip relinquished its concession, however, and the field has been developed only recently. In January 1999, SembGas of Singapore signed a contract to purchase 325 million cubic feet per day (Mmcfd) of natural gas from the West Natuna Gas Consortium, a joint venture consisting of Pertamina, Conoco, and Gulf Indonesia Resources. A

contract for the pipeline was awarded to McDermott International, which began supplying natural gas to Singapore in mid-2001. In November 1999, Conoco reported a new gas discovery at West Natuna which raised reserves by about 1 Tcf.

Another major project in the planning stages is BP's Tangguh LNG project in Irian Jaya, based on over 14 Tcf of natural gas reserves found onshore and offshore the Wiriagar and Berau blocks. The project would involve two trains with a combined capacity of 6 million tons per year. A contract for the initial engineering and design work had been awardeed to Chiyoda and Mitsubishi of Japan, and BP's current plans call for the project to be completed by 2006. The project is considered risky due to an active separatist movement in Irian Jaya. BP holds a 48% interest in the Berau block with partners Mitsubishi at 22.87%, Nippon Oil Exploration, 17.14% and KG Berau Petroleum, 12%. For the Wiriagar block, Arco holds an 80% interest and KG Wiriagar Petroleum Ltd. holds the remaining 20%. Pertamina is reportedly studying the feasibility of moving two of the Arun LNG terminal's liquefaction trains, which were shut down in April 2000 due to declining production at mature natural gas fields, to Irian Jaya for the Tangguh terminal, which could reduce the cost of the project. BP announced in November 2001 that it had signed an agreement to supply LNG to the Philippines beginning in 2006, and in December 2001 announced that it had made a formal proposal to China for supplies of gas to its planned Guangdong LNG regasification terminal. El Paso Energy has been reported to have had discussions on possible supplies of LNG from Tangguh to future import terminals in the United States or Mexico.

Another LNG project recently completed is construction of an eighth LNG train at the Bontang LNG plant in East Kalimatan, which became operational in December 1999. The train added 3 million tons per year to the capacity at Bontang. Development of new LNG capacity in the coming decade is a critical issue for Indonesia, as the Aceh LNG terminal's output declines.

In another possible use for Indonesia's gas resources, Shell is examining the

possibility of building a gas-to-liquids (GTL) plant in Indonesia. The plant, if the project goes forward, would produce 70,000 bbl/d of diesel and other middle distillates using the Fischer-Tropsch GTL process.

COAL

Indonesia has 5.75 billion short tons of recoverable coal reserves, of which 85% is lignite and 15% is anthracite. Sumatra contains roughly two-thirds of Indonesia's total coal reserves, with the balance located in Kalimantan, West Java, and Sulawesi. In 1999, Indonesia exported 59.2 million short tons (Mmst), or about 83% of its coal production. The majority of these exports are destined for Japan, South Korea, Taiwan.

Indonesia plans to double coal production over the next five years, mostly for exports to other countries in East Asia and India. The new capacity will come primarily from private mines. The Clough Group of Australia was awarded a $215-million contract for improvements at the Indonesian firm GBP's Kutai mine in East Kalimatan. Another foreign firm with major interests in Indonesian coal mining is Australia's Broken Hill Proprietary (BHP).

ELECTRICITY GENERATION

Indonesia has installed electrical generating capacity estimated at 21.4 gigawatts, with 84% coming from thermal (oil, gas, and coal) sources, 14% from hydropower, and 2% from geothermal. Prior to the Asian financial crisis, Indonesia had plans for a rapid expansion of power generation, based mainly on opening up Indonesia's power market to Independent Power Producers (IPPs). The crisis led to severe financial strains on state-utility Perusahaan Listrik Negara (PLN), which made it difficult to pay for all of the power for which it had signed contracts with IPPs. PLN has over $5 billion in debt, which has grown markedly in terms of local currency due to the decline in the value of the rupiah. The Indonesian government has been unwilling to take over the commercial debts of PLN.

The first major IPP to be completed was the Paiton I project, a 1,230 megawatt (MW) coal-fired plant, which cost $2.5 billion. Paiton I was

completed in early 1999 by a consortium including Edison Mission Energy, General Electric, and Mitsui. Sufficient demand for power from the plant did not exist when it was completed, however, and the plant was not activated. Paiton I's owners complained that PLN failed to pay the "capacity charge" due under the contract in the event that PLN fails to buy power from the plant during a particular period. In October 1999, PLN filed suit against Paiton, seeking to void its contract on the grounds of alleged improprieties under the Suharto regime. Paiton has denied the charges, and the Indonesian government stepped in to order PLN to drop the suit in December 1999, fearing a general loss of foreign investor confidence if such a large obligation were cancelled. After lengthy negotiations, the Paiton consortium and PLN agreed in November 2000 on a settlement which included a downward tariff adjustment and a long-term payment scheme.

PLN also had to cancel some contracts with IPPs which have yet to make significant progress on their projects. Projects with a combined capacity of about 15,000 MW were cancelled in late 1997, as the Asian financial crisis began. Some of the foreign investors backing IPPs in Indonesia abandoned partially-built projects, such as the 1,320 MW Tanjung Jati-B thermal plant in central Java, on which construction was halted in 1998. PLN concluded an agreement with Sumitomo Corporation in 2001 for the resumption of the project, and construction is set to begin before the end of 2002.

With its economy growing at a modest rate, PLN is warning that the country's power surplus could turn to deficit again within the next few years, but thus far, there has been little interest on the part of foreign investors in new IPP projects. PLN's financial health is gradually improving, though, as the Indonesian government has permitted sharp tarriff increases over the last two years. The Indonesian government has been considering the possibility of separating out and privatizing some of PLN's generation assets, but enabling legislation has not yet been enacted.

ENVIRONMENT

Indonesia's major environmental challenges involve supporting its large population. Air and water pollution have reached critical levels, especially on the most populated island of Java. Indonesia's carbon emissions remain low, but there is concern that an increase in the use of indigenous coal will increase Indonesia's carbon emissions in the coming years. Indonesia is well endowed with renewable energy potential, especially geothermal energy. Indonesia's renewable resouces are not yet fully exploited.

Sources for this report include: CIA World Factbook 2000; Dow Jones News Wire service; Economist Intelligence Unit ViewsWire; Oil & Gas Journal; Petroleum Intelligence Weekly; Platt's Oilgram News; Reuters News Wire; U.S. Energy Information Administration; U.S. Department of State; DRI/WEFA Asia Economic Outlook.

COUNTRY OVERVIEW

President: Megawati Sukarnoputri (since July 2001)
Independence: Proclaimed independence on August 17, 1945. On December 27, 1949, Indonesia became independent from the Netherlands.
Population (2001E): 228.4 million
Location/Size: Southeastern Asia/735,310 sq. mi., slightly less than three times the size of Texas
Major Cities: Jakarta (capital), Surabaya, Bandung, Medan, Semarang, Palembang, Ujung Pandang
Languages: Bahasa Indonesia (official), English, Dutch, local dialects including Javanese
Ethnic Groups: Javanese (45%), Sundanese (14%), Madurese (7.5%), coastal Malays (7.5%), other (26%)
Religions: Muslim (88%), Protestant (5%), Roman Catholic (3%), Hindu (2%), Buddhist 1%), other (1%)
Defense (8/98): Army (220,000), Navy (43,000), Air Force (21,000), Paramilitary forces: Police (177,000), KAMRA (People's Security)(1.5 million trainees)

ECONOMIC OVERVIEW

Currency: Rupiah
Exchange Rate (1/10/02): US$1 = 10,438 rupiah
Gross Domestic Product (2002E): $169.81 billion
Real GDP Growth Rate (2001E): 3.1% **(2002E):** 3.5%
Inflation Rate (Consumer Price Index)(2001E): 11.2% **(2002E):** 8.8%
Current Account Balance (2002E): $2.7 billion
Merchandise Exports (2002E): $65.4 billion
Merchandise Imports (2002E): $45.5 billion
Merchandise Trade Balance (2002E): $19.9 billion
Major Export Products: Manufactured goods, petroleum, natural gas and related products, foodstuffs, raw materials
Major Import Products: Capital equipment, raw and intermediate materials, consumer goods, petroleum products
Major Trading Partners: Japan, United States, Singapore, Hong Kong, Britain, Australia
Total External Debt (2002E): $149.9 billion

ENERGY OVERVIEW

Energy Minister: Purnomo Yusgiantoro (appointed August 2000)
Proven Oil Reserves (1/1/01): 5.0 billion barrels
Oil Production (1st ten months 2001E): 1.49 million barrels per day (bbl/d), of which 1.22 million bbl/d was crude oil
Crude Oil Production Capacity (2002E): 1.25 million bbl/d
OPEC Production Quota (since 1/1/02): 1.125 million bbl/d
Oil Consumption (2001E): 1,022,000 bbl/d
Net Oil Exports (2001E): 428,000 bbl/d
Major Oil Customers: Japan, United States, South Korea, China, Australia, Taiwan, Singapore, Thailand
Crude Oil Refining Capacity (1/1/02E): 992,745 bbl/d
Natural Gas Reserves (1/1/02E): 92.5 trillion cubic feet (tcf)
Natural Gas Production (1999E): 2.34 trillion cubic feet (tcf)
Natural Gas Consumption (1999E): 0.97 tcf

Net Gas Exports (1999E): 1.37 Tcf
Major LNG Customers (2001): Japan, South Korea, Taiwan
Coal Reserves (12/31/96): 5.75 billion short tons of recoverable reserves of which 85% is lignite and 15% is anthracite
Coal Production (1999E): 71.2 million short tons (Mmst)
Coal Consumption (1999E): 12.0 Mmst
Net Coal Exports (1999E): 59.2 Mmst
Major Coal Customers (2001): Japan, Taiwan, South Korea, the Philippines
Electric Generation Capacity (1/1/99E): 21.4 gigawatts
Electricity Production (1999E): 78.7 terawatthours

ENVIRONMENTAL OVERVIEW

Total Energy Consumption (1999E): 3.6 quadrillion Btu* (1.0% of world total energy consumption)
Energy-Related Carbon Emissions (1999E): 64.3 million metric tons of carbon (1.1% of world total carbon emissions)
Per Capita Energy Consumption (1999E): 17.2 million Btu (vs U.S. value of 355.8 million Btu)
Per Capita Carbon Emissions (1999E): 0.31 metric tons of carbon (vs U.S. value of 5.5 metric tons of carbon)
Energy Intensity (1999E): 22,412 Btu/ $1990 (vs. U.S. value of 12,638 Btu/ $1990)
Carbon Intensity (1999E): 0.40 metric tons of carbon/thousand $1990 (vs. U.S. value of 0.19 metric tons/thousand $1990)
Sectoral Share of Energy Consumption (1998E): Industrial (32.3%), Transportation (16.1%), Residential (49.2%), Commercial (2.4%)
Sectoral Share of Carbon Emissions (1998E): Industrial (46.1%), Transportation (27.0%), Residential (23.5%), Commercial (3.4%)
Fuel Share of Energy Consumption (1999E): Oil (57.1%), Natural Gas (29.5%), Coal (7.7%)
Fuel Share of Carbon Emissions (1999E): Oil (61.4%), Natural Gas (27.8%), Coal (10.8%)
Renewable Energy Consumption (1998E): 2,048 trillion Btu* (4% increase from 1997)

Number of People per Motor Vehicle (1998): 45.5 (vs U.S. value of 1.3)
Status in Climate Change Negotiations: Non-Annex I country under the United Nations Framework Convention on Climate Change (ratified August 23rd, 1994). Signatory to the Kyoto Protocol (signed July 13th, 1998 - not yet ratified).
Major Environmental Issues: Deforestation; water pollution from industrial wastes, sewage; air pollution in urban areas.
Major International Environmental Agreements: A party to Conventions on Biodiversity, Climate Change, Endangered Species, Hazardous Wastes, Law of the Sea, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94 and Wetlands. Has signed, but not ratified, Desertification and Marine Life Conservation.

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.
**GDP based on EIA International Energy Annual 1999

OIL AND GAS INDUSTRIES

Organizations: Perusahaan Pertambangan Minyak dan Gas Bumi Negara (Pertamina) - oil exploration, production, transportation, and marketing; Perum Gas Negara (PGN) -gas distributor and transmission company
Major Producing Oil Fields: Duri, Minas, Belida, Ardjuna, Arun, KG/KRA, Widuri, Nilam, Attaka
Oil Refineries (1/1/02): Cilacap, Central Java (380,000); Pertamina-Balikpapan, Kalimantan (240,920); Musi, South Sumatra (109,155); EXOR-1, Balongan, Java (125,000); Dumai, Central Sumatra (114,000); Sungai Pakning, Central Sumatra (47,500); Pangakalan Brandan, North Sumatra (4,750); Cepu, Central Java (3,420)
Product Pipelines: Trans-Java (serving the Surabaya market)

Oil Tanker Terminals: Java: Cilegon, Cilacap, Surabaya, Ardjuna B (offshore) **Sumatra:** Pangkalan Brandan, Belawan, Dumai, Musi, Perlak, Palembang, Tanjung Uban (offshore) **Kalimantan:** Balikpapan Sulawesi: Ujung Pandang **Irian Jaya:** Sorong, Jaya Seram: Bula Natuna Sea: Ikan Pari
Major Gas Fields: Sumatra: Arun, Alur Siwah, Kuala Langsa, Musi, South Lho Sukon, Wampu **East Kalimantan:** Attaka, Badak, Bekapai, Handil, Mutiara, Nilam, Semberah, Tunu **Natuna Sea:** Natuna **Java:** Pagerungan, Terang/Sirasun **Irian Jaya:** Tangguh
Major Gas Pipelines: Sumatra: Pangkalan Brandan-Dumai
LNG Plants: Arun, Bontang

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Indonesia: Environmental Issues

Introduction

Indonesia's rapid population growth, in addition to industrial expansion has led to severe environmental degradation in the country. The problems were furthered by the Asian financial crisis of 1997-1998, which accelerated natural resource depletion as environmental regulations were set aside and people opted for less expensive and environmentally damaging production and harvesting methods.

Indonesia contains 10 percent of the world's forest cover, and also the third largest tropical rain forest. One of the major problems facing Indonesia today is rapid deforestation due to illegal logging activities and burning for agricultural purposes, exacerbating both high levels of smog and air pollution that have affected neighboring countries. From 1997-1999 Indonesian forests vanished at an estimated rate of 2.4 to 3 million hectares a year --the highest deforestation rate in the world.

The Indonesian government is focusing its attention on the oil and gas industries. The Minister of Environment hopes that the energy industry could become a pioneering force for the country's sustainable development and contribute to economic growth, social welfare and environmental protection.

Air Pollution

Air pollution, caused mostly by automobiles, is the most severe energy related environmental problem affecting Indonesia. In 2000, atmospheric lead pollution was at 1.3 micrograms (mg) per cubic meter (cu m) in Jakarta, above the World Health Organization limit of 0.5-1.0 mg/cu m. The World Bank has identified lead emissions from gasoline as the greatest environmental danger to Indonesians, especially to children.

Until recently, Indonesia's environmental regulations had not been widely enforced due mainly to political and economic troubles. However, air pollution problems in major cities have led the government to begin to target the transportation sector. In Jakarta, leaded gasoline pollution costs the country some $266 million per year in health care, with approximately 3 million children at risk for lead exposure that could affect brain development.

The government of Jakarta has begun a program, with help from the IMF, to restrict lead in premium and

high-octane gasoline sold in the city in hopes of setting an example, and also as part of a drive to eliminate leaded gasoline throughout the country by 2003. In addition, the government has installed new air quality monitoring stations and will require exhaust emission tests annually in order to renew license plates. In 2000, the government established air quality monitoring stations in 10 cities in Indonesia, including Pekanbaru in Riau, Jambi in Sumatra, Potianak in West Kalimantan, Denpasar in Bali and Surabaya in East Java.

Controlling air pollution in Jakarta may prove to be difficult because despite the country's economic problems, the national vehicle growth rate is still approximately 15% per year, and leaded gasoline is still less expensive than unleaded. Although the Asian economic crisis of 1997-1998 made it more difficult for PT Pertamina, the national oil company, to secure loans necessary to build a catalytic reformer to process leaded gasoline into unleaded, the company is continuing preparations for the phase out. In May 2001, Pertamina reduced the lead concentration in fuel from 4.5cc/USG to 0.2cc/USG, and plans to have this level down to zero by the end of 2001. Indonesia's Minister of Energy and Mineral Resources has announced that the government would subsidize the price difference between leaded and unleaded gasoline in order to ease the transition.

A number of provinces in eastern Indonesia have urged the national government to promote the use of lead free gasoline following the example of Jakarta. Two provinces pushing particularly hard are North and South Sulawesi, both of which have large numbers of cars.

Air pollution caused by illegal logging activities and burning for agricultural purposes has also led to high levels of smog that affect Indonesia and neighboring countries as well. Due to the severity of the illegal deforestation, the Indonesian government is working towards stronger regulations and enforcement to prevent further damage to the national forests and the environment.

Water Pollution

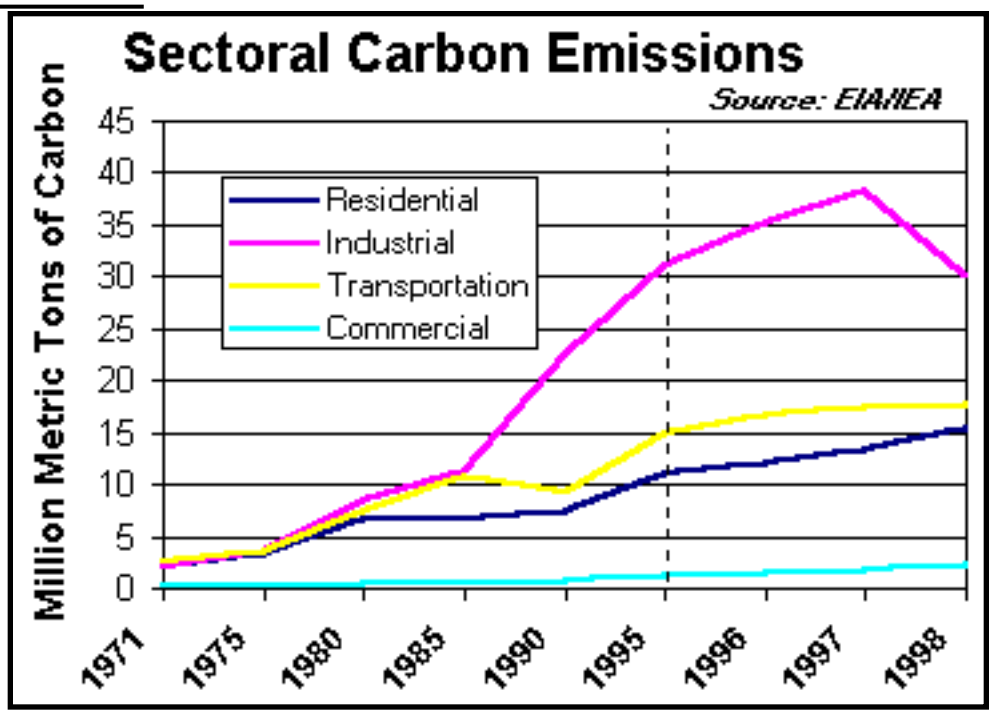
The South China Sea region is one of the world's busiest international sea-lanes. More than half of the world's supertanker traffic passes through the region's waters. The South China Sea also contains oil and gas resources and is located near large energy consuming countries. Indonesian waters are highly polluted, especially in high traffic areas such as the Malacca and Lombok Straits, the major shipping pathway between Asia and the Middle East. According to the UNEP, approximately 80% of the region's coral reefs are at risk from climate change, coastal development, pollution, over-exploitation and cyanide and dynamite fishing.

Industry is another major source of water pollution. The economic downturn has left industrial producers with less capital to devote to pollution mitigation. Increased population and decreased water supply have intensified the concentration of pollutants in the water, leaving Indonesians with a diminishing fresh water supply.

Environmental improvement projects are underway in the region as the governments of Cambodia, China, Indonesia, Malaysia, Philippines, Thailand and Vietnam are seeking to cooperate on a $32 million

plan to protect the marine environment from the effects of climate change, coastal development, pollution and overfishing. The World Bank's Global Environment Facility (GEF) is planning to fund $16 million of the project and another $7 million will come from donors.

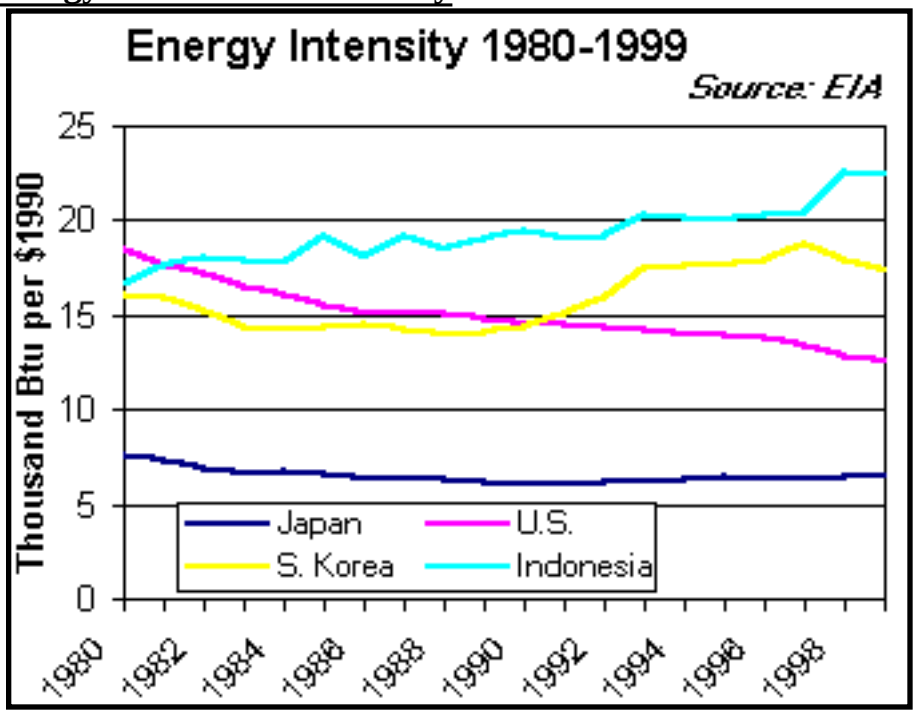
Energy Use and Carbon Emissions



Indonesia is responsible for 1% of the world's total energy related carbon emissions and 0.9% of world energy consumption. Indonesia's total energy related carbon emissions in 1999 were 64.3 million metric tons (mmt), while total energy use was 3.6 quadrillion Btu (quads). This was a slight decrease from 1998 levels of 65.4 mmt of energy related carbon emissions and total energy use of 3.62 quads.

Industrial sector carbon emissions have dropped considerably as the country recovers from the Asian financial crisis. Transportation sector carbon emissions, however, continue to grow steadily as the ever-growing population demands more cars. Some proposals for public buses in urban areas to run on natural gas (a less carbon intense fuel) have been set back due to a lack of infrastructure for transporting and using natural gas.

Energy and Carbon Intensity

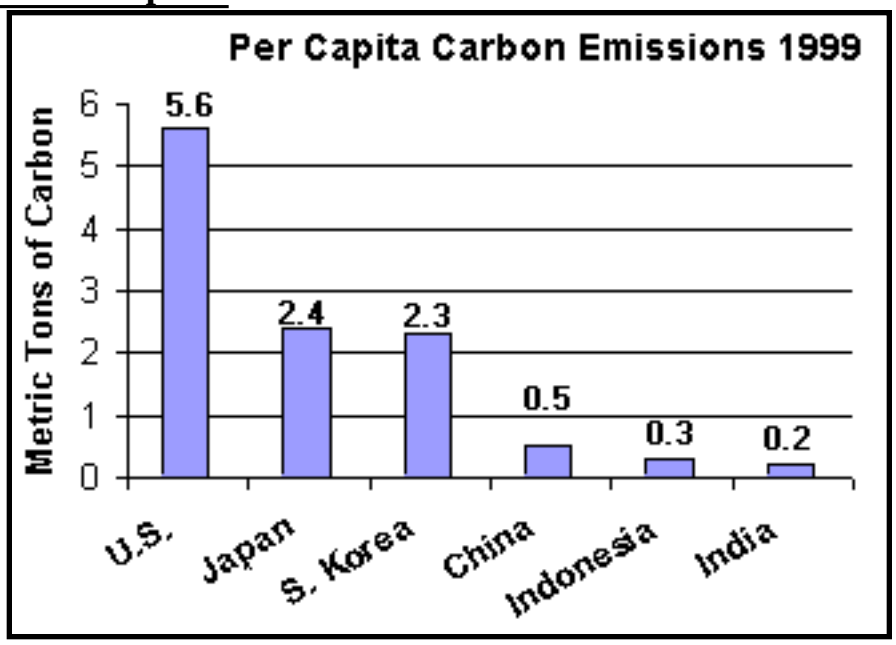


Indonesia's energy consumption per dollar of GDP has increased over the past twenty years, from 16.71 thousand Btu per $1990 in 1980, to 22.41 thousand Btu per $1990 in 1999. At the present stage in Indonesia's industrialization, energy intensity is likely to remain high. In the aftermath of the Asian financial crisis, the country needed to increase domestic production as imports became too expensive. The rapid growth of the industrial sector, a large energy consumer, has made Indonesia relatively more energy intensive compared to other countries.

As with energy intensity, carbon intensity in Indonesia is high relative to other countries. Because Indonesia is a large oil and gas consumer, carbon emissions are likely to remain high. In 1999, Indonesia emitted 0.4 metric tons of carbon per thousand $1990, higher than Japan (0.09 metric tons per thousand $1990), the United States (0.2) and South Korea (0.25).

Per Capita Carbon Emissions and Energy Consumption

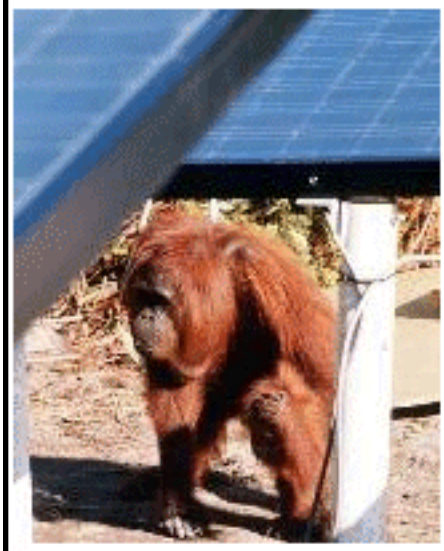
Per capita energy consumption and carbon emissions remain low relative to more industrialized countries mainly because of a large population that live in areas with little or no electricity. In 1999, Indonesia's per capita energy consumption was 17.2 million Btu, compared to more industrialized countries such as the United States (355.9 million Btu/person), Japan (171.6), South Korea (156.8) but above India's level of 12.3 million Btu per capita.



Indonesia's industrial sector is the country's largest consumer of energy and emitter of carbon. The country's industrial based economic growth has resulted in a dramatic increase in energy consumption and carbon emissions. As Indonesia's economy continues to recover from its 1997-1998 economic collapse, energy consumption is expected to rise.

Renewable Energy

Because Indonesia is a large oil and gas producing country, most of its energy needs are met through this industry (80.4%). However, economic crisis, depletion of oil reserves and environmental needs are leading the country towards more renewable energy sources. In 1999, renewable energy sources accounted for only 5% of electric power generation.



Orangutans examine a PV array for the Solar in the Jungle Project at the International Orangutan Foundation's Camp Leakey in Indonesia. The PV panels are used to charge batteries for lighting in the huts and for charging battery packs for flashlights.

Source: Environment News Service, 1999

Large-scale renewable energy projects are planned, including an $11 million World Bank GEF project towards a "Solar Home System" in order to meet the electrification needs of rural areas with renewable energy. Work on this project is planned to begin in 2002. The government has also built a 5,600-MW hydropower plant to support economic development in Irian Jaya. Solar/PV technology is an attractive option in Indonesia because the country is fragmented among numerous small islands, making a comprehensive grid difficult to construct.

Though Indonesia has great potential for geothermal power generation, this sector has yet to be fully tapped. Geothermal energy is a renewable energy source produced when ground water descending from the earth's surface meets molten magma rising toward the earth's surface, creating steam. The steam is trapped in the earth's crust in reservoirs, which can be accessed by drilling a well into the reservoir. Indonesia has some of the most geologically active territory in the world, with numerous active volcanoes (many of which lie in the heavily traveled straits). The "Ring of Fire," the world's most active volcanic zone, stretches along the southern coast of Sumatra and Java.

Environment Outlook

Indonesia's forest cover, together with the rain forests of South America and Africa, comprises one of the main "carbon sinks" (natural means of sequestering world carbon emissions). The preservation of such sinks is as important to climate change issues as the reduction of carbon emissions. Deforestation is a major problem in Indonesia, but the country stands to benefit from the Clean Development Mechanism (CDM) of the Kyoto Protocol, should the treaty enter into force. Through the CDM, Indonesia could receive foreign aid to promote less carbon intensive energy sources and protect the country's forest cover.

As Indonesia's population of 200 million continues to grow (albeit at a declining pace), the country's main environmental challenge will involve meeting the needs of this population. Indonesia is endowed with an appreciable supply of energy sources -- both fossil and renewable. Indonesia does have considerable renewable resources, most notably geothermal, which could help to control carbon emissions.

As Indonesia recovers from the economic and political turmoil of the late 1990s, its environment

ministry faces the challenge of enacting and enforcing environmental legislation. The legal system in Indonesia will have to strengthen its environmental legislation against violations such as the intentional setting of forest fires and the use of leaded gasoline. Protection of Indonesia's environment in the 21st century will require that such issues be addressed.

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